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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,710	03/10/2004	Michael E. Yoder	200314971-1	6166

22879 7590 03/22/2007

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EXAMINER	
BRADLEY, MATTHEW A	
ART UNIT	**PAPER NUMBER**
2187	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/798,710	YODER, MICHAEL E.
	Examiner	Art Unit
	Matthew Bradley	2187

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _21 December 2006_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-7,9-11 and 13-22_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-7, 9-11, and 13-22_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This Office Action has been issued in response to amendment filed 21 December 2006. Applicant's arguments have been carefully and fully considered but are moot in view of the new ground(s) of rejection as necessitated by amendment. Accordingly, this action has been made FINAL.

Claim Status

Claims 1-7, 9-11, and 13-22 remain pending and are ready for examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **1-4**, **7**, **9-11**, **13-14**, **19**, and **21-22** are rejected under 35 U.S.C. 103(a) being unpatentable over Koenen (U.S. 2004/0019891), hereinafter referred to as Koenen, and in view of Elnozahy et al (U.S. 6,701,421), hereinafter referred to as Elnozahy,

As per independent claim **1**, Koenen teaches,

- providing a data structure including sets of equidistant physical memory localities; and (Paragraph 0026)

- selecting a preferred physical memory locality using a pointer to a locality within said data structure (Paragraph 0051).

Koenen does not explicitly teach, wherein the pointer is rotated amongst localities within a current equidistant set so as to provide for round-robin type selection amongst those equidistant physical memory localities.

Elnozahy teaches, wherein the pointer is rotated amongst localities within a current equidistant set so as to provide for round-robin type selection amongst those equidistant physical memory localities (Column 6 line 63 to Column 7 line 5).

Koenen and Elnozahy are analogous art because they are from the same field of endeavor namely, memory allocation.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Koenen and Elnozahy before him/her to combine the round robin allocation scheme of Elnozahy with Koenen for the benefit of equal portion allocation on each node.

The suggestion for doing so would have been that, in a striped allocation policy, blocks of address space are allocated among the nodes in a rotating manner such that a portion of the allocated memory resides on each of the nodes (Column 6 lines 63-67 of Elnozahy).

Therefore, it would have been obvious to combine Koenen with Elnozahy for the benefit of equal portion allocation to each node to obtain the invention as specified in claims 1-4, 7, and 9-10.

As per dependent claim **2**, the combination of Koenen and Elnozahy teach, receiving an initial locality request including an indication of a search policy; and forming the data structure using physical memory localities within the system and using the search policy (Paragraph 0047 of Koenen).

As per dependent claim **3**, the combination of Koenen and Elnozahy teach, wherein the physical memory localities include local memories at cells in the system (Paragraph 0051 of Koenen).

As per dependent claim **4**, the combination of Koenen and Elnozahy teach, wherein the search policy comprises a "closest first" policy (Paragraph 0048 of Koenen).

As per dependent claim **7**, the combination of Koenen and Elnozahy teach, wherein the selection of the preferred locality is performed using a get "best"/"next best" iteration procedure (Paragraphs 0025-0026 of Koenen).

As per dependent claim **9**, the combination of Koenen and Elnozahy teach, wherein the determination of the preferred locality includes changing to a next equidistant set if there is no memory available in any locality of a current equidistant set (Paragraph 0037 of Koenen as shown in the description preceding with reference to paragraphs 0033-0036 of Koenen).

As per dependent claim **10**, the combination of Koenen and Elnozahy teach, further comprising returning an indication that no locality is available if no locality within any of the equidistant sets has sufficient memory (Paragraph 0052 of Koenen).

As per independent claim **11**, Koenen teaches,

- multiple symmetric multiprocessing (SMP) nodes; (Figure 1 as described in Paragraphs 0019-0021)
- multiple central processing units (CPUs) at each SMP node; (Figure 1, items 12A-12C for example, as described in Paragraphs 0019-0021)
- a memory control unit at each SMP node which is coupled to each CPU at that SMP node; (Figure 1, items 12I, 14I, and 16I as described in Paragraphs 0019-0021)
- shared memory at each SMP node which is accessible by way of the memory control unit at that SMP node; (Figure 1, items 12H, 14H, 16H, as described in Paragraphs 0019-0021)
- a switching system coupled to the memory control units so as to interconnect the multiple SMP nodes; (Figure 1, item 18 as described in Paragraphs 0019-0021)
- an operating system running on the CPUs; (Paragraph 0027, taught as 'the O/S')
- a virtual memory (VM) fault handler within the operating system; and (Paragraph 0047)
- a VM locality module within the operating system; and (Paragraph 0037)
- a data structure including sets of equidistant physical memory localities, wherein the VM locality module determines a preferred locality using a pointer to a locality within the data structure, and (Paragraph 0026 as shown in Table 2 directly beneath the paragraph).

Koenen does not explicitly teach, wherein the pointer is rotated amongst physical memory localities within a current equidistant set so as to provide for round-robin type selection amongst those equidistant physical memory localities.

Elnozahy teaches, wherein the pointer is rotated amongst physical memory localities within a current equidistant set so as to provide for round-robin type selection amongst those equidistant physical memory localities (Column 6 line 63 to Column 7 line 5).

Koenen and Elnozahy are analogous art because they are from the same field of endeavor namely, memory allocation.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Koenen and Elnozahy before him/her to combine the round robin allocation scheme of Elnozahy with Koenen for the benefit of equal portion allocation on each node.

The suggestion for doing so would have been that, in a striped allocation policy, blocks of address space are allocated among the nodes in a rotating manner such that a portion of the allocated memory resides on each of the nodes (Column 6 lines 63-67 of Elnozahy).

Therefore, it would have been obvious to combine Koenen with Elnozahy for the benefit of equal portion allocation to each node to obtain the invention as specified in claims 11 and 13-14.

As per dependent claim **13**, the combination of Koenen and Elnozahy teach, wherein the preferred locality is determined using a "closest first" search policy (Paragraph 0048 of Koenen).

As per dependent claim **14**, the combination of Koenen and Elnozahy teach, wherein the data structure comprises a first set including a closest local memory locality and one or more other sets of equidistant localities (Paragraph 0048 and 0051 of Koenen).

As per independent claim **19**, Koenen teach,

- a data structure for use in selecting a physical memory locality in a multiprocessor system, the data structure being configured in accordance with a search policy and comprising multiple sets of equidistant physical memory localities under the search policy (Paragraph 0026 of Koenen as shown in Table 2 directly beneath the paragraph of Koenen).

Koenen does not explicitly teach, wherein a pointer is rotated amongst localities within a current equidistant set so as to provide for a round-robin type selection amongst those equidistant physical memory localities.

Elnozahy teaches,

- wherein a pointer is rotated amongst localities within a current equidistant set so as to provide for a round-robin type selection amongst those equidistant physical memory localities (Column 6 line 63 to Column 7 line 5 of Elnozahy).

Koenen and Elnozahy are analogous art because they are from the same field of endeavor namely, memory allocation.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Koenen and Elnozahy before him/her to combine the round robin allocation scheme of Elnozahy with Koenen for the benefit of equal portion allocation on each node.

The suggestion for doing so would have been that, in a striped allocation policy, blocks of address space are allocated among the nodes in a rotating manner such that a portion of the allocated memory resides on each of the nodes (Column 6 lines 63-67 of Elnozahy).

Therefore, it would have been obvious to combine Koenen with Elnozahy for the benefit of equal portion allocation to each node to obtain the invention as specified in claims 19 and 21-22.

As per dependent claim **21**, the combination of Koenen and Elnozahy teach, wherein the search policy comprises an "closest first" policy, and wherein a first set comprises a most rapidly accessible memory locality (Paragraphs 0048 and 0051 of Koenen).

As per independent claim **22**, the combination of Koenen and Elnozahy teach,

- a virtual memory manager configured for extending a memory space beyond limits of a physical address space; (Paragraph 0027 of Koenen)
- a virtual memory locality module configured to rapidly select a physical memory locality in the system; and (Paragraph 0037 of Koenen).

- Using a pointer to a data structure having sets of equidistant physical memory localities, wherein the pointer is rotated amongst physical memory localities within a current equidistant set so as to provide for round-robin types selection amongst those equidistant physical memory localities (Column 6 line 63 to Column 7 line 5 of Elnozahy).
- a virtual memory fault handler configured to interrupt execution of the virtual memory manager when a page fault occurs and to utilize the virtual memory locality module to determine the physical memory locality from which to allocate memory in response to the page fault (Paragraph 0047 of Koenen).

Claims **5-6**, **15-18**, and **20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Elnozahy and Koenen and further in view of Horstmann et al (U.S. 6,125,433), hereinafter referred to as Horstmann. (The Microsoft Computer Dictionary Fifth Edition is used as evidentiary support).

As per dependent claim **5**, the combination of Elnozahy and Koenen teach the limitations as noted supra.

The combination of Elnozahy and Koenen does not explicitly teach, wherein the physical memory localities further includes interleaved memory in the system.

Horstmann teaches, wherein the physical memory localities further includes interleaved memory in the system (Column 1 lines 57-67).

Elnozahy and Koenen and Horstmann are analogous art because they are from the same field of endeavor namely, memory allocation.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Elnozahy and Koenen, and Horstmann before him/her to combine the interleaved allocation of Horstmann with Elnozahy and Koenen for the benefit of reducing wait states and using available memory efficiently.

The suggestion for doing so would have been that, provides an efficient use of main memory. For example, a process's main memory allocation need not be contiguous; processes in main memory can be interleaved (Column 1 lines 61-64 of Horstmann). Further, in the Microsoft Computer Dictionary, interleaved memory is defined as a method of organizing addresses in RAM memory in order to reduce wait states. Given this ordinary definition, with Elnozahy and Koenen, and Horstmann, it would have been obvious to implement interleaved memory into Elnozahy and Koenen to further improve the allocation methods of Elnozahy and Koenen.

Therefore, it would have been obvious to combine Elnozahy and Koenen with Horstmann for the benefit of interleaved memory to obtain the invention as specified in claims 5-6, 15-18, and 20.

As per dependent claims **15-16**, and **18**, the combination of Elnozahy and Koenen with Horstmann teach, wherein the physical memory localities further includes interleaved memory in the system (Column 1 lines 61-64 of Horstmann).

As per dependent claim **6**, **17**, and **20**, the combination of Elnozahy and Koenen with Horstmann teach, wherein the search policy comprises an "interleaved first" type of policy (Column 1 lines 61-64 of Horstmann).

Response to Arguments

Applicant's arguments filed 21 December 2006 have been carefully and fully considered but are moot in view of the new ground(s) of rejection as necessitated by amendment.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. U.S. 6,272,612 Bordaz et al teach a process for allocating memory in a multiprocessor data processing system (see also column 8 lines 60-64 that teach round-robin allocation).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew Bradley whose telephone number is (571) 272-8575. The examiner can normally be reached on 6:30-3:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald A. Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BRP/mb MB

Brian R. Peugh
Primary Examiner
3/19/07